

CLAIMS

1. A memory device including a memory element comprising:

a memory layer containing 2 at% or more and less than 25 at% of at least one element selected from the group consisting of Ge, Sb, and Bi, 40 at% or more and 65 at% or less of Te, and 20 at% or more and 50 at% or less of at least one element selected from the group 2b, group 1b, groups 3a to 7a, and group 8 elements, and storing information by causing reversible phase-change between a crystal phase and an amorphous phase; and

an electrode formed on both surfaces of the memory layer.

2. A memory device according to claim 1, wherein one element selected from the groups is Zn or Cd of the group 2b.

3. A memory device according to claim 1, wherein the group elements comprising the group 2b, group 1b, groups 3a to 7a, and group 8 elements are partially or entirely replaced with nitrogen.

4. A memory device according to claim 1, wherein the memory layer contains 5 at% or more and less than 20 at% of at least one element selected from the group consisting of Ge, Sb and Bi, 45 at% or more and 60 at% or less of Te, 25 at% or less of at least one element selected from the group 2b, group

1b, groups 3a to 7a, and group 8 elements.

5. A memory device according to claim 1, wherein the memory device is used within an atmosphere at 145°C or higher.

6. A memory device according to claim 1, further comprising a region, in adjacent to the memory layer, in which the content of Zn or Cd is higher by 10 at% or more than that of the layer of the memory layer containing Zn or Cd.

7. A memory device according to claim 1, wherein the memory device transmits 30% or more of recording light or reading light.

8. A memory device comprising:

a plurality of memory cells;

a plurality of word lines for selecting the plurality of memory cells;

a plurality of data lines arranged orthogonally to the plurality of word lines and reading signals from the plurality of memory cells;

wherein each of the plurality of memory cells includes:

a memory layer containing Ge or Sb, 40 at% or more of Te, 20 at% or more and 50 at% or less of at least one element selected from the group 2b, group 1b, groups 3a to 7a, and group 8 elements, and recording information by causing reversible phase-change between a crystal phase and an amorphous phase; and

electrodes formed so as to sandwich the memory layer

therebetween for applying a voltage to the memory layer.

9. A memory device according to claim 8, wherein an insulating film is disposed between the memory layer and one surface of the electrode.

10. A memory device including a memory element comprising:

a memory layer containing 2 at% or more and less than 25 at% or less of Ge and Sb, 40 at% or more and 65 at% or less of Te, and at least one element selected from 20 at% or more and 50 at% or less of the group 2b, group 1b, groups 3a to 7a, and group 8 elements, and storing information by causing reversible phase-change between a crystal phase and an amorphous phase; and

an electrode formed on both sides of the memory layer.

11. A memory device according to claim 10, wherein one element selected from the groups is Zn or Cd as the group 2b element.

12. A memory device according to claim 10, wherein the group element comprising the group 2b, group 1b, groups 3a to 7a, and group 8 elements are partially or entirely replaced with nitrogen.

13. A memory device according to claim 10, wherein

the memory layer contains 5 at% or more and less than 20 at% of Ge and Sb, 45 at% or more and 60 at% or less of Te, and 25 at% or less of at least one element selected from the

group 2b, group 1b, groups 3a to 7a, and group 8 elements, and nitrogen.

14. A memory device according to claim 10, wherein the memory device is used in an atmosphere at 145°C or higher.

15. A memory device according to claim 10, further comprising, in adjacent to the memory layer, a region in which the content of Zn or Cd is higher by 10 at% or more than that in the layer of the memory layer containing Zn or Cd.

16. A memory device according to claim 10, wherein the memory element transmits 30% or more of recording light or reading light.

17. A memory device comprising:

a plurality of memory cells;

a plurality of word lines for selecting the plurality of memory cells;

a plurality of data lines arranged orthogonally to the plurality of word lines and reading signals from the plurality of memory cells;

wherein each of the plurality of memory cells includes:

a memory layer containing Ge, Sb, 40 at% or more of Te, and 20 at% or more and 50 at% or less of at least one element selected from the group 2b, group 1b, groups 3a to 7a, and group 8 elements, and recording information by causing reversible phase-change between a crystal phase and an amorphous phase; and

electrodes formed so as to sandwich therebetween the memory layer for applying the voltage to the memory layer.

18. A memory device according to claim 17, wherein an insulating layer is disposed between the memory layer and one surface of the electrode.